

# Solid-state Ceramic Laser Material for Remote Sensing of Ozone Using Nd:Yttria, Phase I

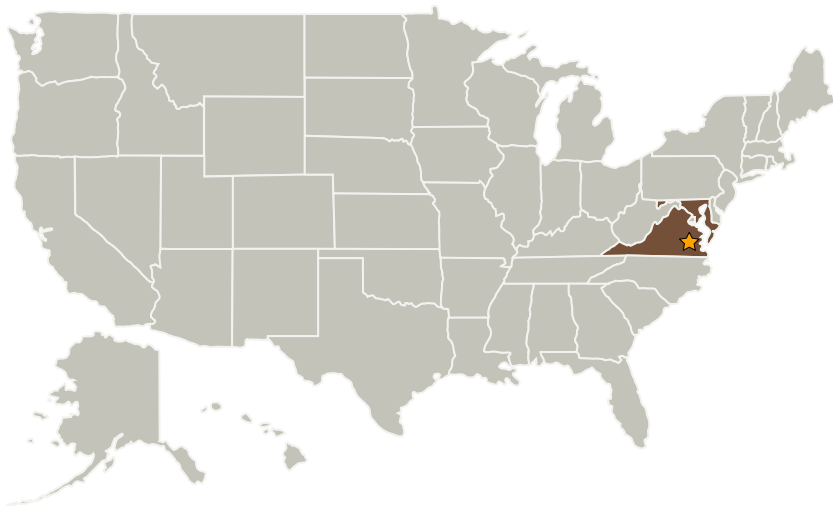
Completed Technology Project (2004 - 2004)



## Project Introduction

Tunable solid state lasers have played an important role in providing the technology necessary for active remote sensing of the atmosphere. Recently, polycrystalline ceramic laser materials have become of great interest for diode-pumped solid state lasers. Compared to single-crystals, ceramic laser materials offer advantages in terms of ease of fabrication, shape, size, and dopant concentrations. We propose to develop neodymium doped yttria as a solid-state ceramic laser material for remote sensing of ozone. Neodymium doped yttria has emission lines at 914 nm and 946 nm. When these emission lines are frequency tripled, they correspond to  $\sim 305$  nm and  $\sim 315$  nm. These wavelengths are of particular interest since NASA is endeavoring to develop LIDAR devices for global monitoring that measure the differences in the back-scattered energy at two closely spaced ultraviolet wavelengths to derive a measure of the ozone distribution. Research has shown that neodymium doped yttria is one of the few materials capable of producing two wavelengths that, when frequency tripled, result in wavelengths around 305 nm and 315 nm. Thus, we propose a scalable production method to make spherical non agglomerated and monodisperse ceramic powders of neodymium doped yttria that can be used to fabricate polycrystalline ceramic material disks with sintered grain size in a suitable range. The polycrystalline ceramic material will be characterized for its suitability as a diode pumped solid state laser.

## Primary U.S. Work Locations and Key Partners



Solid-state Ceramic Laser Material for Remote Sensing of Ozone Using Nd:Yttria, Phase I

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Langley Research Center (LaRC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Solid-state Ceramic Laser Material for Remote Sensing of Ozone  
Using Nd:Yttria, Phase I

Completed Technology Project (2004 - 2004)



Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Brimrose Corporation of America	Supporting Organization	Industry	Sparks, Maryland

## Primary U.S. Work Locations

Maryland	Virginia
----------	----------

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Sudhir B Trivedi

## Technology Areas

**Primary:**

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - └ TX12.4 Manufacturing
    - └ TX12.4.1 Manufacturing Processes